भारतीय मानक
Indian Standard

IS 18063 : 2022

साइथ — विशिष्टि

Scythes — Specification

ICS 65.060.50

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भारतीय मानक ब्यूरो
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December 2022 **Price Group 8**

Agricultural Machinery and Equipment Sectional Committee, FAD 11

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Agricultural Machinery and Equipment Sectional Committee had been approved by the Food and Agriculture Division Council.

A scythe is an agricultural hand tool for mowing grasses like *barseem*, *jowar*, *lucerne* or harvesting crops like wheat, paddy, oats and ragi etc. The snath has either one or two short grips at right angles to it, sometimes one near the upper end and always another roughly in the middle. The handles are usually adjustable to suit the user. A curved, steel blade is mounted at the lower end of the snath which is the most important part of a scythe.

The cutting edge of a scythe blade is traditionally maintained by occasional peening followed by frequent sharpening. Peening reforms the malleable edge, by hammering, to create the desired profile, to temper the metal and to remove minor nicks and dents; for mowing fine grass the bevel angle may be peened extremely fine, while for coarser work a larger angle is created to give a more robust edge.

Scythes are designed for different tasks. A long, thin blade is most efficient for mowing grasses or fodder, while a shorter, more robust scythe is more appropriate for harvesting wheat, paddy, oats or legumes like *chana, moong, urad,* etc.

The composition of the Committee responsible for the formulation of this standard is placed at Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SCYTHES — SPECIFICATION

1 SCOPE

This standard specifies the requirements for scythes for harvesting of fodder, grasses, cereals, crops etc.

2 REFERENCES

The Indian Standards given reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated.

IS No.	*Title*
IS 513 (Part 1) : 2016	Cold reduced carbon steel sheet and strip: Part 1 cold forming and drawing purpose (*sixth revision*)
IS 1570 (Part 4) : 1988	Schedules for wrought steels: Part 4 alloy steels (Alloy Constructional And Spring Steels) with specified chemical composition and mechanical properties (*first revision*)
IS 3601 : 2006	Steel tubes for mechanical and general engineering purposes — Specification (*second revision*)
IS 7226 : 1974	Specification for cold — Rolled medium, high carbon and low alloy steel strip for general engineering purposes

3 TERMINOLOGY

A standard scythe kit (*see* Fig 1, 3 & 10) has the following components:

a) Blade
b) Snath/Handle — 2 parts; 1 grip
c) Cradle — 4 curved ribs; 3 vertical posts
d) Peening Jig — 1 anvil; 2 caps
e) Sharpening Kit — 1 synthetic whetstone; 1 natural whetstone; 1 holder
f) Tool Kit — Attachment Ring; L-Bracket; Hammer; Allen Key; Nuts-bolts; D/E Spanner

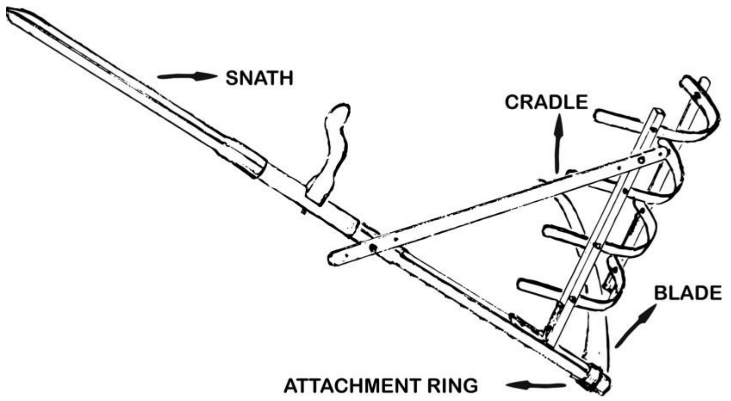

FIG. 1 AN ASSEMBLED SCYTHE

For the purpose of this standard the following definitions shall apply.

3.1 Scythe Blade

The main metallic (steel) part or the blade of the scythe used for cutting action. It should be manufactured by forging a single piece of steel (*see* Fig. 2).

This blade includes different terminologies:

3.1.1 *Body of the Blade*

The body of the blade, from edge to rib, should have conicity or a tapered cross-section. In the area near the cutting edge, the blade is the thinnest. Moving towards the rib of the blade, the body progressively gets thicker.

3.1.2 *Edge*

The curved cutting side of the blade. It must be thinner than the rear part; the more you go close to the rib, more it needs to be thicker.

3.1.3 *Rib*

The thicker steel of the rib gives rigidity to the blade. The rib thickness should be commensurate with the type of the scythe blade, its dimensions, and its intended use.

3.1.4 *Tang*

It is the part of the blade which connects to the snath (handle). The tang is tapered (thicker at the neck end, thinner at the knob end) to add strength without adding unnecessary weight. The strength of the neck comes from an increased thickness and profile of the neck.

3.1.5 *Tip/Point*

The pointed end of the blade where the rib and the edge come together.

3.1.6 *Lug/Knob*

A small stub of steel on the tang which keeps the blade in place when it is attached to the snath using an attachment ring.

3.1.7 *Toe*

The end of the edge closest to the tip.

3.1.8 *Heel*

The end of the edge closest to the tang.

3.1.9 *Beard*

The width of the blade at the heel.

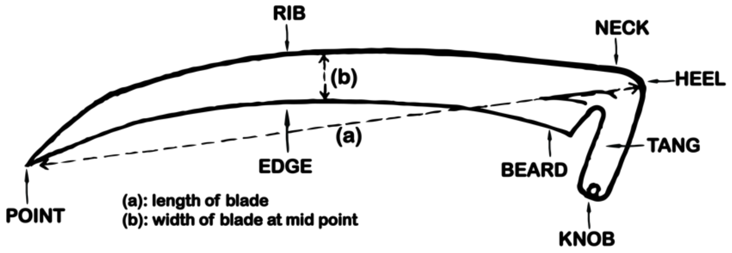

FIG. 2 A STANDARD SCYTHE BLADE

3.2 Snath

The metal or wooden shaft of the scythe, which serves as the handle. It is generally made in two parts, which can be easily assembled but can also be made in single piece.

3.2.1 *Upper Part*

The upper portion of the scythe, which is generally held by the user in his left hand.

3.2.2 *Grip*

Generally located in the centre and held by the user in his right hand. Can be bolted or clamped onto the snath.

3.2.3 *Lower Part*

The lower portion of the scythe, which has holes for attaching the cradle and the blade.

3.2.4 *Pipe/Bracket*

The part, which helps in attaching the two halves of the wooden snath. Not required in case of a metal snath.

3.3 Cradle

The wooden or metal fan shaped attachment, which helps in sweeping, supporting and laying the crops in neat rows. It has four curved ribs or fingers and three vertical posts, which can be easily assembled.

3.3.1 *Curved Ribs*

The finger like components, bent at almost 90 degrees to serve for sweeping and laying the crops.

3.3.2 *Vertical Posts*

The frame of the cradle, which sits on the snath and supports the crop.

3.3.3 *Diagonal Brace*

It connects the snath and cradle for steadiness.

3.4 Peening Jig

3.4.1 Peening is the process which primarily shapes and thins the bevel of the cutting edge of a scythe blade. This makes it easier to manually sharpen the blade in the field with a sharpening stone. Secondly, the molecular structure of the steel changes by cold working (hammering) along the cutting edge.

3.4.2 Consequently, after this peening treatment, the edge becomes harder and will have better sharpness retention. For these reasons, peening is a very efficient and important practice for the blade maintenance.

3.4.3 Peening is done by a mechanical device, called Peening Jig which has the following parts (*see* Fig. 10).

3.4.3.1 *Base*

The component which supports the blade when it is being hammered; contains a central shaft to guide the movement of the caps and a pointed base which can be set into a block of wood.

3.4.3.2 *Peening caps*

3.4.3.2.1 The first cap (marked with one groove) will reach from 2 to 3 mm in from the edge and should produce a visible depression akin to a shallow trough running from beard to point.

3.4.3.2.2 The second cap (marked with 2 grooves) will flatten the material between that 'trough' and the outermost tip of the edge.

3.5 Sharpening Kit

It is an essential part of a scythe kit and is used for honing and sharpening the edge of a scythe blade (*see* Fig. 3). It contains 3 things:

3.5.1 *Synthetic Stone*

Corundum or carborundum stone useful for coarse honing of the blade after peening

3.5.2 *Natural Stone*

Any natural stone with fine grit useful for fine honing of the blade in the field; better used when wet. Both stones have identical profiles.

3.5.3 *Stone Holder*

Helps in carrying the natural stone to the field in a wet condition which helps in better honing of the blade

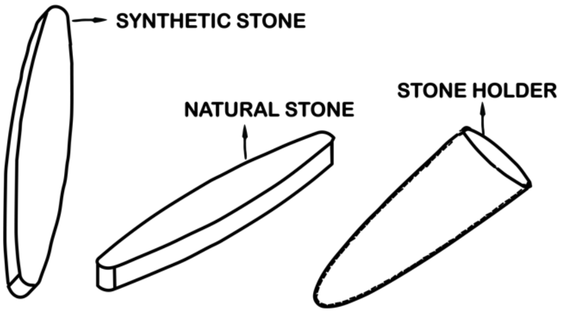

FIG. 3 SHARPENING KIT

3.6 Tool Kit

3.6.1 *Attachment Ring*

Secures the blade onto the snath by means of an M-12 allen bolt (*see* Fig. 4).

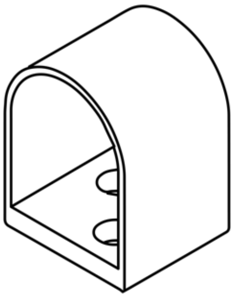

FIG. 4 ATTACHMENT RING

3.6.2 *L-Bracket*

Secures the cradle onto the snath (*see* Fig. 5).

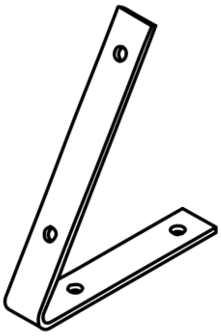

FIG. 5 L–BRACKET

3.6.3 *Miscellaneous Tools*

The kit also contains 1 Allen Key, 1 D/E Spanner, all the necessary nuts, bolts and washers to achieve the assembly along with 1 machinist hammer for peening.

4 TYPES

For the purpose of this standard, the scythes shall be of following two types:

a) Ditch scythe — This type of scythe is more robust, shorter and heavier, better for hard work than grass scythes; and
b) Grass scythe — This type of scythe which is relatively lighter, longer and thinner and more efficient for mowing grass, wheat and rice.

5 MATERIAL REQUIREMENTS

5.1 Blade

The blade shall be manufactured from tool steel conforming to grade C70 as per IS 7226.

5.2 Snath

The snath shall be manufactured from cold drawn seam welded pipe made as per Grade CEW of IS 3601 or seasoned straight grain wood like ash or beech.

5.3 Grain Cradle

The cradle shall be manufactured from wood like ash or beech or cane which responds well to steam bending.

5.4 Peening Jig

The peening jig shall be manufactured from grade 105Cr5 as per IS 1570 (Part 4).

5.5 Sharpening Kit

The synthetic stone shall be manufactured from carborundum or corundum, natural stone shall be made from any sandstone of fine grit and stone holder shall be manufactured from galvanised iron or bamboo.

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5.6 Tool Kit

The Attachment Ring and L Bracket shall be manufactured from Grade CR2 as per IS 513 (Part 1) and all other tools shall be of a standard make.

6 CONSTRUCTIONAL REQUIREMENTS

6.1 Scythe blades (*see* Fig. 2, 6 and 7) are manufactured in different lengths and weight for different uses.

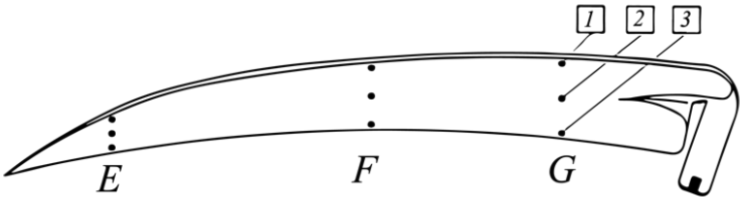
6.2 For a given blade length the ratio of weight/length shall be within the specified range (*see* Table 1) for a general purpose scythe blade.

6.3 The blades shall be manufactured by hot forging (to a suitable thickness) to give a good combination of high strength and low weight. This is followed by heat treatment with adequate tempering so the blade is resilient and not too hard (to avoid cracking), followed by a special cold hammering procedure to create internal tensions in the thin steel. This additional cold hammering process, called "tensioning", results in additional compressive strength while maintaining sufficient flexibility (*See* Annex A for details)

6.4 Conicity is an essential aspect of blade design because:

a) a blade with conicity will have excellent strength where needed;
b) the weight of this blade will be minimized, requiring less exertion to use;
c) it is easier to keep this blade sharp, since the user can hone the thin edge in the field, and maintain the thin tapered edge by peening it occasionally; and
d) with a thin tapered edge, the blade will perform more efficiently in the field, since the fine edge will cut better, and the occasional peening will work-harden the edge to make it last longer.

The exact representation of the conicity and relative thicknesses throughout the blade shall be as follows:



	Thickness (mm)			
Position	E	F	G	Tolerance (mm)
1	1.3	1.4	1.4	± 0.3
2	1.0	0.9	0.9	± 0.3
3	0.8	0.7	0.7	± 0.3

FIG. 6 CONICITY OF A STANDARD SCYTHE BLADE

6.5 To enable effective honing of the entire cutting edge, the height of the rib shall progressively decrease near the point, as described below:

a) the rib shall be full length from the heel to the point;
b) the rib height shall be 9 mm ± 2 mm (except near the point);
c) the rib thickness shall be 3.5 ± 0.5mm; and
d) within 10 cm from the point, the rib height shall progressively decrease down to zero height at the point.

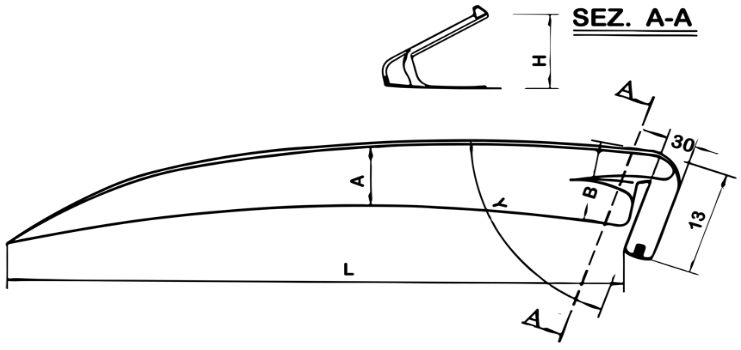
6.6 The following specifications shall be followed for the tang:

a) tang height from ground to the highest part : 90 mm ± 5 mm
b) tang thickness at the knob end : 2 mm ± 0.5 mm
c) tang thickness in the middle : 3.5 mm ± 0.5 mm
d) tang thickness close to the heel : 4.5 mm ± 0.5 mm
e) total length of the tang : 130 mm ± 1 mm
f) width of the tang : 30 mm ± 0.5 mm
g) the knob has to be: 7 mm high ± 1 mm

6.7 The tip/point should be to be strong in order to avoid damages during mowing and its thickness shall be 3 mm ± 0.5 mm.

6.8 Overall Dimensions

Dimensions of the scythe blade shall be as per Fig. 7.



Parameter	Weight (gm)	Width (mm)		Length (mm)	Height (mm)	Angle (°)
		A	B	L	H	Y
	370	46	70	550	90	72
Tolerance	± 25	± 3	± 3	± 25	± 3	+0/-3

FIG. 7 OVERALL DIMENSIONS OF SCYTHE BLADE

6.9 The snath (*see* Fig. 8) shall vary in size according to the user's height. The snath length may vary between 1500 to 1800 mm and diameter may vary between 25 to 30 mm.

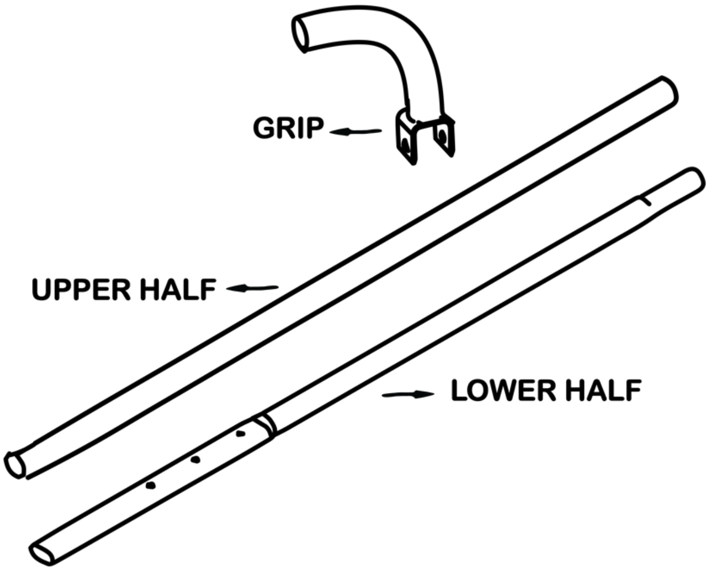


FIG. 8 SNATH IN TWO PARTS

6.10 The cradle (*see* Fig. 9) shall be between 730 to 780 mm high.

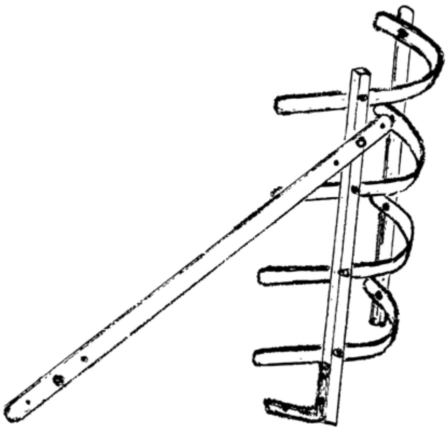


FIG. 9 GRAIN CRADLE

6.11 In case of peening Jig, the base should be between 100 to 110 mm long; both the caps should be 50 to 60 mm long and should have a diameter of 20 to 25 mm.

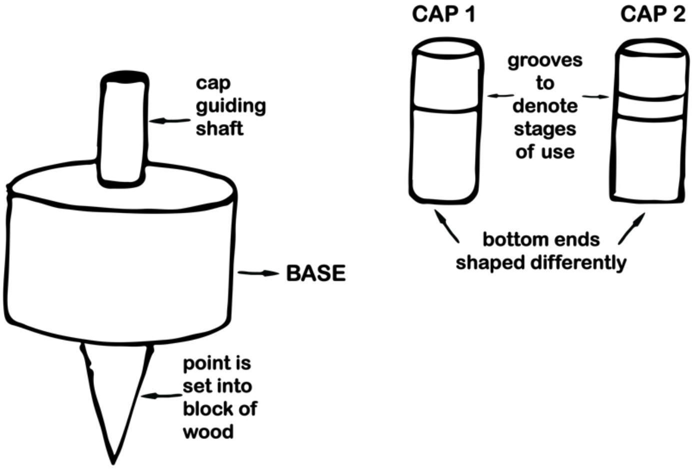


FIG. 10 PEENING JIG AND PEENING CAP

7 HARDNESS

7.1 The scythe blade shall be hardened and tempered to the hardness range of 38 to 46 HRC (*Hardness Rockwell C).*

7.2 The peening jig shall be hardened and tempered to the hardness range of 50 to 58 HRC (*Hardness Rockwell C).*

8 TESTS

8.1 The blade manufacturer shall ensure that the blades in particular meet the requirements of this standard with regard to weight and compressive strength.

8.2 Six blades are randomly pulled out of every batch of 300 blades and a Compressive Strength Test shall be performed on these blades as per Annex B.

8.3 The test results shall be recorded as per Annex C and shall be available for inspection by the purchaser or his representative at the manufacturer's site.

8.4 The test load for which a sample of the blade shall not buckle when tested in the prescribed manner; shall be as specified in Table 1.

Table 1 Numerical Values of Length, Weight, Test Loads and Vertical Displacement Limits for Blades
(*Clauses* 6, 7 *and* 8)

Length (mm)	**Weight Range** (gm)	**Test Load** (kg)	**Vertical Displacement Limit Under Test Load** (mm)
350 ± 20	280 ± 20	30	13
400 ± 20	300 ± 20	30	13
450 ± 20	320 ± 20	30	15
500 ± 25	340 ± 25	30	22
550 ± 25	370 ± 25	30	22
600 ± 25	410 ± 25	30	24
650 ± 30	450 ± 30	30	24
700 ± 30	500± 30	30	29
750 ± 30	560 ± 30	30	29
800 ± 35	620 ± 35	30	35
850 ± 35	670 ± 35	30	35
900 ± 35	730 ± 35	30	35

9 WORKMANSHIP AND FINISH

9.1 The blade shall be smoothly forged and shaped without tear and blister and be free from cracks, seams, scales, pits, burrs, nicks, and other defects.

9.2 In the scythe factory the cutting edge should receive two peening passes by a specially shaped power hammer head. A blade with a well-peened factory edge (*see* Fig. 11) will be ready to use right out of the box.

9.3 The cutting edge shall be sharpened to give a fine finish for immediate use in case of ready to use scythes.

9.4 All sharp edges, except the cutting edge shall be rounded off. There shall be no sign of deformation due to heat treatment, twist, strain, rust, etc.

9.5 The blade shall be given a coat of anti-corrosive and anti-rust paint except the cutting edges.

9.6 On the heel of each blade there will be put a paint of the colour agreed with the customer.

9.7 The snath shall be given a coat of anti-corrosive paint if metal and varnish if wood. The grip, if metal, shall have a suitable plastic or foam covering for easy handling. All parts should have snug fit.

10 MARKING AND PACKING

10.1 Marking

Each scythe shall be marked with the following particulars on the blade:

a) Manufacturer’s name and recognized trademark (hot stamped into the steel tang), if any;
b) Size (hot stamped into the steel tang);
c) Any label required by the customer; and
d) Any other markings required under the Standards of Weights and Measures (Packaged Commodities) Rules, 1977 and any other statutory requirement.

10.2 Packing

a) The scythes of one type and size shall be packed in bundles of six or multiples of six, convenient for handling in transit or as specified by the purchaser; and
b) Along with the snath, cradle and other accessories, complete kits may also be packed in individual boxes for easy handling and shipping

10.3 The packaging shall be in strong cardboard boxes and on each blade and on all the edges there will be a hard plastic protection.

10.4 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

ANNEX A

(*Clause* 6.3)

TENSIONING OF A SCYTHE BLADE

A-1 In the factory setting, tensioning is done by power hammers specifically designed for this purpose. "Tensioning" is achieved by placing power hammer strikes next to each other in a deliberate pattern (*see* Figure 11). Each strike of the power hammer creates a small mark (area) where the material is stretched thinner. It is the relation of these marks to each other that creates lasting tension in the blade.

A-2 A well-tensioned blade is stiff yet elastic

A-3 enough to flex if needed to prevent damage. An inadequately-tensioned blade will buckle under load, bend permanently, or totally break.

A-4 When a poorly-tensioned blade hits a hard lump of dirt or levee, it could deform too much and lose its stiffness, making it perform poorly.

A-5 The minimum compressive force (hereafter called test load) for which a sample of the blade shall not buckle when tested in the prescribed manner; shall be as specified in Table 1.

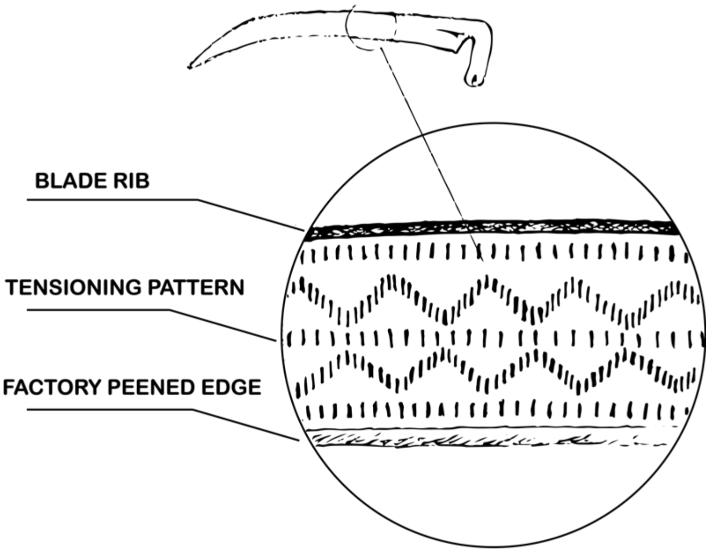


FIG. 11 TENSIONING ON A SCYTHE BLADE

ANNEX B

(*Clause* 8.2)

METHOD OF DETERMINATION OF COMPRESSIVE STRENGTH OF BLADE

B-1 TESTING MACHINE

Testing machine of suitable capacity and certified accuracy shall be used. The testing machine should have an indicator for measuring the amount of vertical displacement under the uniaxial compressive load.

B-2 TEST BLADE

B-2.1 The test blade shall be representative of the batch as a whole and free from defects.

B-2.2 During testing, the ends of the test blade shall be loosely constrained in a vertical orientation in such a way, that the point of the blade is in the downward direction (*see* Fig. 12).

B–2.3 The Blade should be allowed to flex unhindered when loaded.

B-3 TESTING

B-3.1 The Test Blade will be loaded with a uniaxial compressive load (hereafter referred to as Test Load) corresponding to the blade length (*see* Table 1).

B-3.2 80 percent of the test load may be applied quickly; the remaining load shall be applied slowly.

B-3.3 The Test Blade shall be left under the specified load (30 kg) for a time period of 24 hours (*see* Table 1).

B-3.4 In order to pass the test, the Test Blade needs to undergo an acceptable amount of bending under the load, within the loaded vertical displacement limits specified in Table 1, with negligible plastic deformation.

B-3.5 Once the load is removed, the blade must spring back into its original length and shape with no plastic deformation, and have no visible deformation along the blade's length and edge.

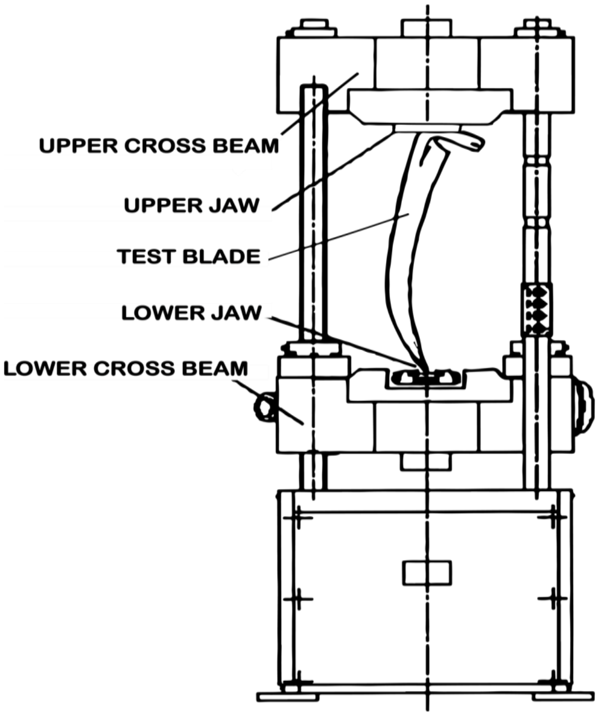


FIG 12 COMPRESSIVE STRENGTH TEST FOR BLADE

ANNEX C

(*Clause* 8.3)

PROFORMA FOR THE CERTIFICATE OF TEST AND EXAMINATION OF SCYTHE BLADE

Certificate No. …………………………. Blade Serial No. ………………………

1. Name and address of maker or supplier of blade : ....

2. Particulars of Blade

2.1 Length of blade : ....
2.2 Weight of blade : ....
2.3 Thickness of the Blade at Point E1, E2, E3 : ....
2.4 Thickness of the Blade at Point F1, F2, F3 : ....
2.5 Thickness of the Blade at Point G1, G2, G3 : ....

2.6 Height of blade Rib : ....
2.7 Thickness of blade Rib : ....
2.8 Coating : ....
2.9 Hardness of the Blade : ....

3. Grade of Blade : ....

3.1 Date of Test of Blade Sample : ....
3.2 Test Load : ....
3.3 Vertical Displacement Under Load : ....
3.4 Vertical Displacement after Load is removed : ....

4. Name and address of test house making test and examination : ....

5. Name and designation of signatory of test house conducting the test and examination:
....
....
....

6. Any other details : ....

I certify that the above particulars are correct and that the scythe blade conforms to IS ....

....

Signature of Competent Person

Date: ....

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

Agricultural Machinery and Equipment Sectional Committee, FAD 11

Organization	*Representative(s)*
ICAR - Central Institute of Agricultural Engineering, Bhopal	Dr C. R. Mehta, Director (***Chairperson***)
Agriculture Machinery Manufacturers Association, Pune	Dr Surendra Singh Shri S. V. Raju (*Alternate*)
All India Farmers Alliance, New Delhi	Dr Rajaram Tripathi Advocate Apurva Tripathi (*Alternate*)
Aspee Agro Equipment Private Limited, Mumbai	Shri Jatin S. Patel Shri Gangadhar Varpe
Automotive Component Manufactures Association of India, New Delhi	Shri A. A. Badusha Shri Girish Tanawade (*Alternate* I) Shri Gangaram Auti (*Alternate* II)
CLAAS India Private Limited, Chandigarh	Shri K. P. Singh
CNH Industrial India Private Limited, Pune	Shri Santhosh Rao (*Alternate* I) Shri Sujit Hinge (*Alternate* II)
Captain Tractors Private Limited, Rajkot	Shri Shailash Movaliya
Central Farm Machinery Training and Testing Institute (CFMT&TI), Budni	Shri P. K. Pandey Shri C. V. Chimote (*Alternate*)
Consumer Guidance Society of India (CGSI), Mumbai	Dr Sitaram Dixit
ICAR - Central Institute of Agricultural Engineering, Bhopal	Dr C. R. Mehta, Director Dr U. R. Badegaonka (*Alternate* I) Dr Dilip Jat (YP) (*Alternate* II)
ICAR - All India Coordinated Research Project on Ergonomics and Safety in Agriculture, Bhopal	Dr K. N. Agrawal
ICAR - All India Coordinated Research Project on Farm Implements and Machinery(AICRP-FIM), New Delhi	Dr C. R. Mehta
ICAR - All India Coordinated Research Project on Utilization of Animal Energy(AICRP), Bhopal	Dr M. Din

Indian Council of Agricultural Research, New Delhi	DR PANNA LAL SINGH SHRI PRAKASH CHANDRA JENA (*Alternate*)
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Kerala Agro Machinery Corporation Ltd. (KAMCO), Athani	SHRI P. C. SAJIMAN SHRI ARUN KUMAR T.K. (*Alternate* I) SHRI VIPIN V. PAVANAN (*Alternate* II)
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National Innovation Foundation, Delhi	SHRI MAHESH PATEL
National Institute of Plant Health Management (NIPHM), Hyderabad	DR VIDHU KAMPURATH P. MS. M. UDAYA BHANU (*Alternate*)
North Eastern Region Farm Machinery Training and Testing Institute (NER-FMTTI) Biswanath Chariali	DR P. P. RAO SHRI S. G. PAWAR (*Alternate* I) SHRI KHAGENDRA BORA (YP) (*Alternate* II)
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Power Tillers Manufacturers Association, Kolkata	SHRI A. R. GANESH KUMAR
Punjab Agricultural University, Ludhiana	DR MANJEET SINGH DR RAJESH GOYAL (*Alternate* I) SHRI APOORV PRAKASH (YP) (*Alternate* II)
Southern Region Farm Machinery Training and Testing Institute (SRFMT&TI), Anantapur	DR K. K. NAGLE SRIMATI T. KAMALABAI (*Alternate*)
Tractor and Mechanization Association (TMA), New Delhi	SHRI HEMANT DIVEKAR
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